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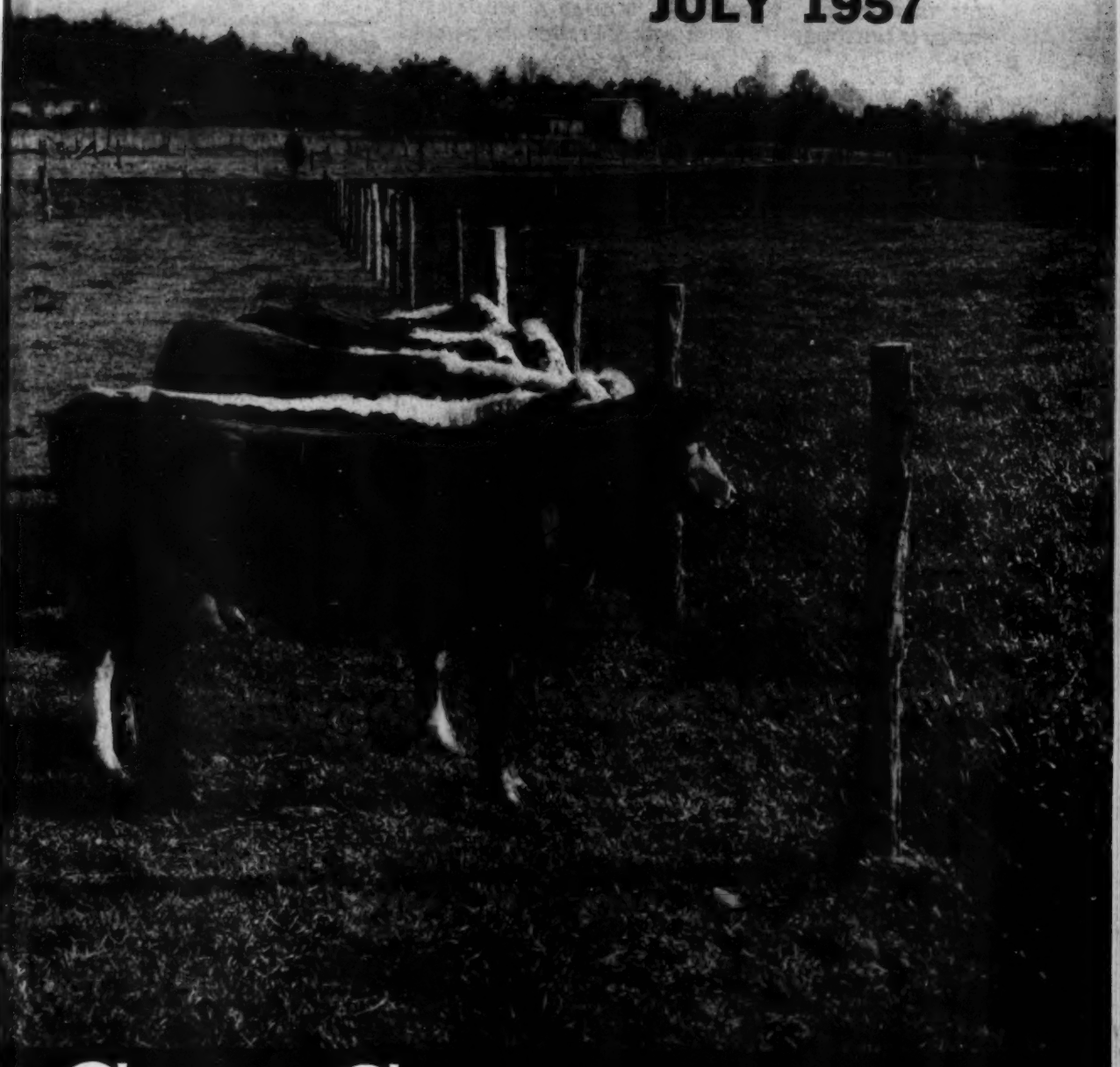

SOIL CONSERVATION

Soil Conservation Service • U. S. Department of Agriculture

JULY—1957

VOL. XXII—NO. 12

SOIL CONSERVATION

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U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

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TOM DALE
Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

15 CENTS PER COPY $1.25 PER COPY

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WATERSHED CONSERVATION is not something apart, or something to take the place of soil conservation district programs. Actually, it is, in effect, the regular program of the districts, supplemented by the addition of flood prevention and other measures in small tributaries and by wider participation by whole communities. It is soil conservation district programs expanded to meet some of the community-type land and water problems which the districts or other local interests do not have the facilities to handle, by themselves.

—D. A. Williams, Administrator Soil Conservation Service.

MORE AND CHEAPER FOOD FROM THE SAME ACRES.—Today, farmers are producing 40 percent more on virtually the same amount of land they farmed before World War II.

Corn yields are up 55 percent—wheat, about 35 percent—cotton, 65 percent—potatoes, over 100 percent. Each cow is giving 30 percent more milk and each hen is laying 45 percent more eggs.

Wages paid for an average hour of manufacturing labor will now buy about 32 percent more food than an hour's wages would buy in 1939.

—Louis H. Wilson, National Plant Food Institute.

FRONT COVER.—These yearlings may not know about the fertilizing and reseeding of that pasture across the fence, but they know that the grass is lusher and greener.

—Photo by Leon J. Sisk

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Use of Fertilizer and Lime

No. 25

This is the twenty-fifth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By J. RICHARD ADAMS

THE 1954 Census of Agriculture gives greater detail on the use of commercial fertilizers and liming materials than any other census report. Data are given, by counties, on the total pasture and crop acreages fertilized and limed, and the total quantity and cost of commercial fertilizers and liming materials used in the continental United States during the calendar year 1954.

The census shows that farmers spent more than a billion dollars in 1954 for 18,869,117 tons of fertilizer at an average price of $56.94 per ton. Essentially all this fertilizer was applied during the year in which it was purchased. Almost three times as much fertilizer was used in 1954 as in 1939. And, the increase in plant nutrients applied was even greater because much of the fertilizer was in more concentrated form.

Although the price of fertilizer increased during this 15-year period, the increase was not as great as the increase in prices paid for most other farm purchases. Index numbers of prices paid by farmers for certain commodities in 1939 and 1954, respectively, were: fertilizers, 101 and 155; farm machinery, 155 and 313; feed, 93 and 226; and seed, 92 and 226.

Fertilizer usage was greatest in the Eastern half of the United States. More than 1 million tons of fertilizer were used in each of 5 States of this area. Three of these States, in the south Atlantic region, used almost 93 percent as much fertilizer as all States west of the Mississippi River. Over 1 million tons of fertilizer were used in 1954 in each region of the United States except New England and the mountain region. The consumption in each of these 2 regions was below 400,000 tons.

Nearly 32 percent of the fertilizer was used on corn in comparison to 21.8 percent applied to corn in 1942. On the other hand, the use on cotton was 9.7 percent of the total in 1954 and 14.4 percent in 1942. Similar comparisons cannot be made for the other crops owing to lack of uniformity in classification.

Rates of fertilizer application per fertilized acre are given for pastures and specific crops. It should be noted, however, that these comparisons and all other data are based on quantities of fertilizer mixtures and materials and not on quantities of nutrients.

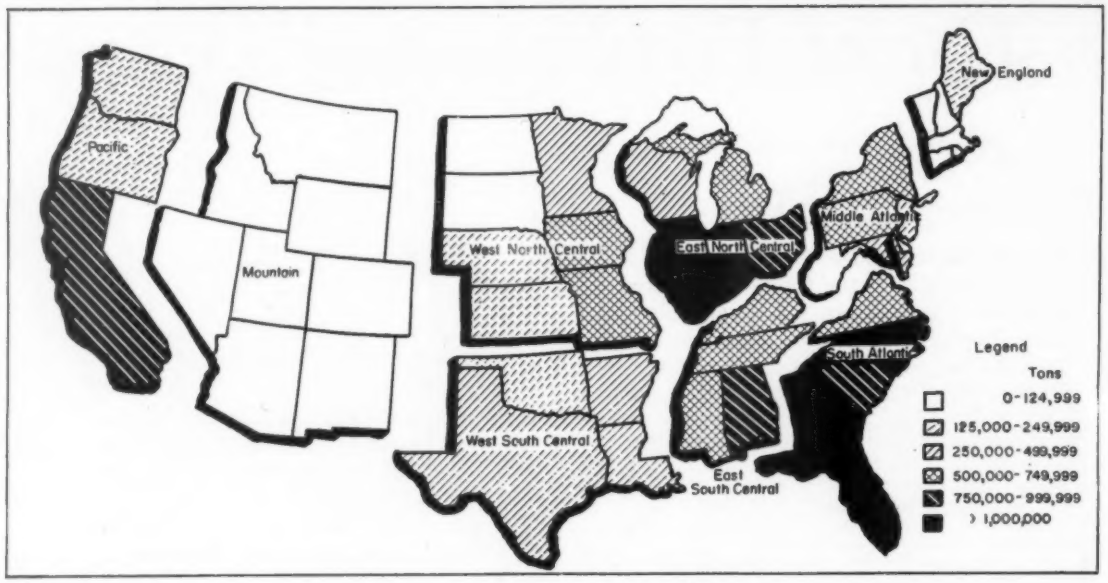
Hay and cropland pasture in the United States received an average of 302 pounds of fertilizer per fertilized acre. The rate of application was 1½ times as great in eastern regions as in western regions. The highest average application was 488 pounds per acre in Virginia; the lowest was 96 pounds per acre in North Dakota.

The use of fertilizer on other pasture closely paralleled the use on hay and cropland pasture, but the rate of application on other pasture was lower than on hay and cropland pasture. In only 2 regions, however, did the average rate on other pasture vary more than 10 percent from that used on hay and cropland pasture.

The average rate of fertilizer application on fruits, vegetables, and potatoes, receiving fertilizer, varied from 1,309 pounds per acre in the south Atlantic region to 268 pounds in the west north-central region, with an average for the United States of 850 pounds.

Over 6 million tons of fertilizer were used on more than 46 million acres of corn. Rates of application were highest in the New England

Note:—The author is with the fertilizer and agricultural lime section, soil and water conservation research division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Md.



Fertilizer consumption by States, 1954.

States, with an average of 523 pounds per fertilized acre. The application rate in Maine was 702 pounds. The rate of use in the west north-central states was lowest; only 78 pounds were used per fertilized acre of corn in North Dakota.

The use of fertilizer on cotton east of the Mississippi River was almost 80 percent higher per acre than the use west of the Mississippi. Fertilizer was used on cotton in South Carolina at the rate of 597 pounds per fertilized acre. This rate was exceeded in Florida but on a relatively small acreage. The highest rate, 383 pounds per acre, west of the Mississippi River was used in California.

The application rate per fertilized acre of wheat in the eastern part of the country was more than 2½ times that west of the Mississippi River. Application rates ranged from 414 pounds per acre in New Jersey to 43 in Montana.

Tobacco was fertilized at the highest rate of any of the crops listed. The United States average was 1,347 pounds of fertilizer per fertilized acre. Tobacco grown in New England received over 1½ tons per acre, whereas in other sections it received a little over half a ton per acre.

Fertilizer was used for sugar beets at the rate of 336 pounds per fertilized acre in the mountain region, exclusive of New Mexico, Arizona, and Nevada. Fertilizer application rates on oats varied from 144 to 220 pounds per fertilized acre for an average of 199 pounds. Fertilizer was applied to rice at an average rate of 212 pounds per acre in California. This was the only State for which data were obtained on the use of fertilizer for rice.

A total of 17,276,170 tons of liming materials were purchased in 1954 at a cost of almost $69.5 million. Liming materials included limestone, hydrated and burnt lime, oyster shells, and similar materials. They were applied at the rate of a little over 1½ tons per acre on less than 11 percent of the farms in the country. More than three-quarters of the liming materials were used in the New England, middle Atlantic, east north-central, and west north-central regions.

The 1954 census reports also show the use of fertilizers for specified crops and the use of lime on irrigated and nonirrigated farms by economic areas. The data are broken down further by economic class of farm, by tenure of farm operator, and by type of farm. The rate of use per acre is given for selected crops for selected economic areas.

For further details on the use of fertilizers and liming materials in the United States in 1954 see:
U. S. Bureau of the Census, U. S. Census of Agriculture: 1954.
Vol. II, General Report, Chapter IV, Farm Labor, use of fertilizer, farm expenditures, cash rent.
Vol. III, Special Reports, Part 10, Use of fertilizer and lime.

Good Grazing

A New Mexico Rancher Has Come Through Two Depressions and Two Droughts With His Range in Excellent Condition, Mainly Because of Good Grazing Management and Other Conservation Practices.

By N. E. TRAMMEL

A long-time rancher, W. F. Pitt, of McKinley County, N. Mex., literally loves grass. It is a great pleasure to ride over Pitt's range and observe the waving seas of galleta, blue gramma, sacaton, and western wheatgrass along the bottomlands, and to note the well-vegetated hillsides.

Pitt first came to the Crownpoint area of McKinley County in 1918 along with his father and other members of the family. The old A. Z. ranch was purchased and he assumed full management in 1923.

The ranch consists of 70 sections, nearly 45,000 acres, all owned by Pitt, except State-owned sections, which he leases. It is divided into 10 pastures. He has put up many more miles of fence since the boundaries were fenced in 1919 and has built 15 stock water ponds. Three artesian wells and two windmill wells also provide water for the livestock.

Erosion-control dams and water-spreading structures have been built in favorable locations. Some of these structures were built several years ago. They have functioned many times. Flooded areas resulting from these structures have provided the only green grass available at various times. They have been of great benefit both during dry as well as wet years, according to Pitt.

The ranch has been so managed, however, that many "natural spreading areas" can be found. Instead of gullied bottomlands, as generally observed, one sees a waving sea of grass along these areas. This can be attributed to Pitt's management and his great belief in good grass.

Native grasses have been given a chance to grow and become vigorous. Pitt has proved that nature will heal the scars of erosion and cure sick land if given a chance. Many old gullies now are healed over with a thick growth of desirable grasses. Hillsides are covered with good stands of palatable grasses, such as blue-grama and galleta, in thrifty condition.

Average annual precipitation for the Crownpoint area is from 9 to 11 inches. Many years not even this amount falls. Rains are unpredictable. This makes a fixed system of deferred and rotational grazing difficult to carry out. Cattle must be moved from pasture to pasture

Note.—The author is work unit conservationist, Soil Conservation Service, Gallup, N. Mex.

An old gully on the W. F. Pitt ranch that has been healed by native grasses.

more or less in accordance with the rainfall pattern. This, Pitt constantly does, keeping cattle scattered over his range wherever there is grass.

Pitt has survived two depressions, one following World War I and the other during the 1930's. And he is now going through his second long drought.

"I concluded years ago that moving cattle to distant pastures during dry years was costly in time, money, and effort," he said. "It occurred to me that saving a reserve of grass during wet years for use during dry times might be the answer. I tried this and found that it removed much financial strain and worry."

Pitt's system has been one of keeping enough grass in reserve to tide him over the dry times. He feels that old grass left on the ground is not wasted, but of great benefit. Cattle will eat this old forage if no green grass is available. It is high in food value. It improves soil conditions by making the ground absorb moisture better. Rains benefit lands in this condition because of little or no runoff. Such rangeland responds to light showers to a greater extent than ranges in depleted condition.

This rancher conducts a detailed study of his grasslands each year after the growing season has passed. He rides his range, not only in his pickup truck along roads and near water holes but also on horseback over the more inaccessible spots. In this way he observes how well his grass has grown. He estimates the amount of feed available, always keeping some in reserve should it turn dry the following spring. He adjusts his livestock numbers to the amount of grass available.

Pitt believes that the rangeland around Crownpoint and vicinity should never be stocked heavier than 10 head of cattle per section, even in wet years. During dry times stocking should be less.

Registered and commercial cattle both are grazed on the ranch. Cotton seedcake is fed during winter months. Hay is not necessary because there is always sufficient old grass or "hay on the ground." During recent dry years, Pitt has never found it necessary to purchase feed under government emergency programs.

The 70 sections under Pitt's control has been managed so they now support a much better, more vigorous vegetation, than before. Erosion control and water-spreading structures have helped, but the main benefit has resulted from proper grazing management.

This rancher started cooperating with the Soil Conservation Service during the early days of its existence. Under this program some fencing and other work was done, with Pitt furnishing materials and other contributions required at that time. He has participated in the Agricultural Conservation Program from time to time.

When the McKinley Soil Conservation District was organized in 1947, Pitt was elected as a supervisor. He served in this capacity until 1954.

HAWAIIAN BANANA KING.—Charles Shiraishi, South Oahu Soil Conservation District director, and a 1949 graduate of the University of Hawaii, farms 40 acres near Honolulu. Among his business associates he is known as "The Banana King".

Twenty years ago his dad, mother, and he came from the Mainland, east of San Francisco and Oakland, to Hawaii. They settled on a tract of land in Manoa Valley and started growing bananas. Today young Shiraishi is using modern soil- and water-conservation practices, producing high-yielding plants, and supplying first-quality fruit to the Hawaiian banana market.

Charles Shiraishi near one of his banana trees.

The home place consists of 20 acres of rented land in Manoa Valley. Recently, the Shiraishis bought another farm in Palolo Valley where banana culture also is carried on. Every day the men harvest the fields and take to market select bananas.

Careful soil management practices are used—all stalks and leaves are left in the field as a mulch for protection of the soil. All weeds and grasses are kept from the fields by spraying. No hoeing or cultivating is done so that all plant roots can help hold the soil in place.

"The Soil Conservation Service technicians, through our Soil Conservation District, give us the help we need for long-time high production", says Mr. Shiraishi. "What worries me now is the speed with which so many acres of our high-producing banana fields are going into subdivisions for homes. The subdividers want the best land and push the farmers further up the steeper, more eroding slopes."

According to this young district director, farmers that work together and use the best possible soil- and water-conservation practices, can give their agricultural community continued long-time high production.

—A. W. EMERSON

Raccoon Conservation

A County Coon Hunters Association Boosts Soil and Water Conservation as a Means of Getting More and Better Raccoons.

By BARRINGTON KING

MOST folks take it for granted that quail hunters and duck hunters are interested in soil and water conservation. Proper use and treatment of these resources improve the habitat for quail and waterfowl.

But when the Anderson County, S. C., Coon Hunters Association asked the local SCS representatives to speak at their regular meeting, the connection wasn't so readily apparent.

The SCS folks, though, worked up the best program they could for the meeting. It included as an introduction a brief history of soil and water conservation, an outline of the organization of districts, and the SCS and district supervisors relationship.

A detailed explanation was given of soil- and water-conservation practices, including treatment of areas for wildlife. Slides were used to point up the improvements brought about by sound conservation treatment.

Note:—The author is information specialist, Soil Conservation Service, Spartanburg, S. C.

The SCS workers weren't sure they had put their message across from the coon hunters' angle. So, after about a 50-minute discussion, they asked for questions. And for the next 30 minutes, the questions flew thick and fast. The hunters' interest in and knowledge of the subject was amazing.

Many members of the association, it turned out, were district cooperators. Some lived in town and had no farms. But the city members apparently were just as interested as the farmers.

Jack Earle, secretary-treasurer of the Coon Hunters Association, summed up the interest of his group at the conclusion of the meeting.

"We have found that wildlife is most abundant where farmers have good soil and water conservation practices on their land," he said. "And the reasons for this are not difficult to find.

"For example, the cover crops and hedgerows that keep topsoil from washing away and help rebuild worn-out lands also provide food and cover for wildlife. Along these hedgerows you find muscadines, wild grapes, and persimmons — the chief foods for raccoons in the fall of the year.

"Wildlife's greatest hazard is fire," he continued. "Fire destroys the essential food for wildlife and destroys the hollow trees which are the favorite home of the raccoon. The services offered by our soil conservation district include measures to prevent fires and provide wildlife food and cover.

"Fish ponds also are a part of the soil conservation district program. They present a good example of the benefits of conservation farming to both the farmer and the sportsman. They provide fishing, swimming, boating, and water for cattle and wildlife.

"To the coon hunter, ponds are of special importance," he pointed out. "These small bodies of water that dot the countryside are a major source of food for the raccoon. These animals feed on frogs, spring lizards, and crawfish, all of which are found in ponds.

"All true sportsmen have a vital interest in the practices that improve soil fertility," he summarized. "The reason for this is simple. Measures taken to conserve the soil serve a double purpose by also helping to protect wildlife."

The Washita Story

An Unruly River is Being Tamed and the Land in Its Watershed Conserved Mainly Because a Group of Citizens Persistently Fought, for 30 Years, to Bring About Concerted Federal, State and Local Cooperation in Solving the Problems.

By TARLETON JENKINS and HARRY M. CHAMBERS

IF a vision can be workworn and dream-patched, the one that is turning into reality on Oklahoma's Washita River merits that description.

This particular vision, you see, is a relatively old one. Some of the people who first conceived it have moved away and some have passed away. Those who are still around find it hard to realize that the events now taking place along the mud-choked stream that meanders 200-odd miles across southwest Oklahoma are the achievements they worked for so long.

Otto Wray, Red Males, Lloyd Church, George Wingo, John Cassady, Jess DeWeese, and many others — the ones who first put their heads together to give promise to their hopes — now watch the fulfillment of their dreams with a nod of satisfaction.

In those early years progress seemed discouragingly slow. Often it was delayed by the clash of interests in high places, or by the emergence of new principles in watershed treatment that had to be weighed and tested, and by an upheaval that tossed into oblivion many other well-laid plans—World War II.

The Washita job, more recently, has been setting a fast pace. It has attracted visitors by the thousands from far-off corners. Its story has commanded the attention of audiences across the Nation. It has been told with millions of words in magazines, books, and newspapers.

Residents in other watersheds, eager for results, observe the rate of progress in the Washita and are surprised. Why, they wonder, does this one program move so swiftly while some of the others are so slow?

For the true answer you must turn back a lot of years, to the early 1930's and even before. You would go back to the time when the groups of citizens were gathering in offices, stores, and schoolhouses, to ask over and over "What can we do?"

You would need to stand with them during times of flood, watching the angry waters as they reached across creek bottoms, across roadways and bridges, tearing at railroads, wrecking homes and barns, wrenching out fences, gouging out soil by the thousands of tons, ruining crops, and sweeping livestock to destruction.

You likely would talk to the residents of Fort Cobb, which was Wingo's home, and the townsfolk in Hammon farther upstream, where E. B. Savage lived.

The Fort Cobb flood in 1927 was one of the worst. It cost thousands of dollars in damage. Hammon, in 1934, took one of the river's cruel-

Main street of Fort Cobb, Okla., April, 1927.

Note:—The authors, both of The Soil Conservation Service, are respectively, information specialist, Fort Worth, Tex., and deputy state conservationist, Stillwater, Okla.

The Washita at flood stage, near Pauls Valley, Okla.

est blows. Seventeen people died one night in April when a cloudburst over Quartermaster Creek watershed brought a sudden head rise into the town.

Up and down the stream, and especially along its tributaries, it was the same. At Clinton, Chickasha, Anadarko, and Pauls Valley and areas in between there was the heartbreak of sudden loss in property, crops, livestock, and human lives.

Following the April 1927 flood at Fort Cobb, the engineers of the U. S. Army checked up on a site for a dam large enough to give protection to the town from the floodwaters of Pond (Cobb) Creek. The preliminary report was ready in 1930.

The dam, northwest of Fort Cobb, was to be 70 feet high and 3,800 feet long. It would receive the runoff from 190 square miles and cost $1,089,200. (A larger structure, for flood control, irrigation and water supply, has more recently been authorized for construction by the Bureau of Reclamation.)

Almost everyone in those years was thinking only of a system of big dams to corral the unpredictable river. Oklahoma's Division of Water Resources published a tailored plan for 29 large dams on the Washita.

However, plans calling for big dams and large areas for flood-control impoundments, did not meet with wholesale approval. Landowners whose bottomlands would be covered by impounded water were adamant in their objections. Some of these lands are of the State's best, with deep, rich topsoil.

The Washita River and its tributaries, as a matter of geologic fact, are somewhat out of character for streams in that area. Most streams have a wide streambed but a relatively narrow flood plain. The streambed of the Washita is narrow but the flood plains of it and its feeder streams are wide and highly productive; a fact that accounts, in part, for the high benefits gained from investment in flood prevention.

Geologists explain that the Washita Valley, thousands of years ago, must have been a huge lake backed up by Oklahoma's Arbuckle Mountains. The River finally cut through the mountains, leaving the broad, flat bottomlands to the west.

Actually, there is a larger total acreage of bottomlands on the tributaries of the Washita than on the main stream itself—approximately 265,000 acres of creek bottomlands to about 112,000 acres in the main Washita plain. The creeks flood oftener; some areas average 9 floods a year. The highest frequency of flooding on any part of the main stem averages just over twice a year.

By the midthirties the term "soil conservation" was being used more often in discussion of flood prevention on the Washita. Soon after the Hammon flood of 1934, a series of meetings were held on soil conservation, water conservation, and flood control at Clinton, Anadarko, Cheyenne, Chickasha, Pauls Valley, and other places.

An organization was formed, with the impressive title of "Washita Valley Soil Conservation and Flood Control Association." Judge Lawrence of Anadarko was elected president of the association; E. B. Savage was named vice president. Jess DeWeese of Custer City spearheaded the membership drive. All it took to become a member was to sign one's name to a petition requesting the Soil Conservation Service to use the entire Washita watershed as a demonstration area for soil and water conservation. Jess and his coworkers got more than 10,000 names on the petition and sent it to H. H. Bennett, then Chief of SCS.

This Association failed to get the entire watershed designated as a demonstration area; but several communities did get smaller demonstration areas or CCC Camps to work on soil conservation.

In the meantime, the Fort Cobb people were still working to get their flood-control dam. The

A typical gully in the upper Washita watershed.

Flood scour and silt deposit on a bottomland field near a tributary of the Washita.

Chamber of Commerce sent Wingo to Washington, D. C., in 1934, to ask for help on the Cobb Creek Dam proposal. He appealed to the National Rivers and Harbors Congress, then in session. The following resolution was the result: "The proposed dam and reservoir on Cobb Creek on Washita River in Oklahoma is hereby approved as economically sound and necessary for the protection of lives and property of the people of that vicinity."

In 1936, Congress passed the Omnibus Flood Control Bill. This put investigations of waterways for flood control in the hands of the War Department and "investigations of watersheds and measures for runoff and waterflow retardation . . . under the jurisdiction of the U. S. Department of Agriculture." It touched off excitement like a spring flood does along the Washita. And, obviously because of the earlier interest shown by the citizens, the Washita watershed was chosen for study.

In February 1938, a group of leaders met in Chickasha. They identified themselves as the Washita Valley Improvement Committee. A Cheyenne banker, L. L. Males, was chairman. They agreed that a tighter knit organization should be formed representing all interests in the watershed.

Two years later the Washita Valley Improvement Association came into being. Otto Wray of Fort Cobb was chosen president. Vice presidents were Dick Longmire of Pauls Valley, Wesley Phillips of Foss, and R. L. Wheeler of

Chickasha. Mrs. Lula K. Pratt of Cheyenne was named secretary-treasurer.

In September, 1940, Otto Wray led a group of association representatives to Great Falls, Mont., to meet with the director of the Bureau of Reclamation and other Federal officials. They learned that the Corps of Engineers and the Department of Agriculture, because of the Nation's preparedness program, had abandoned for the time all work on the Washita program.

A year later came the Pearl Harbor attack. The Soil Conservation Service hurried through the study it had been making under the authority of the Flood Control Act of 1936. Its report, dated September 17, 1943, was one of the first such reports completed and became the basis for later legislation.

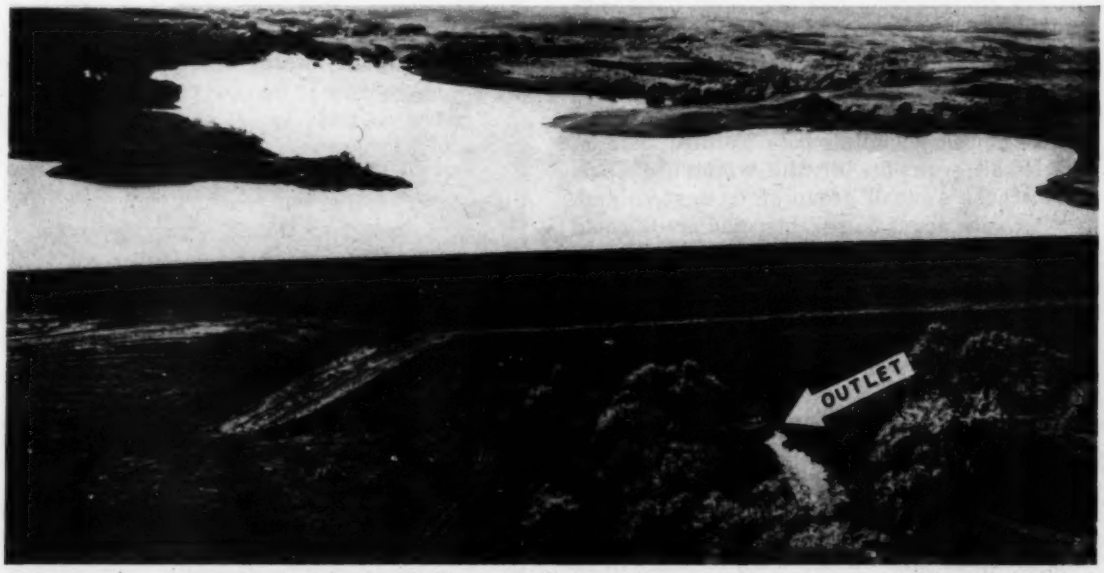
The Congress, in 1944, with the Nation seemingly on the way to victory, passed a Flood Control Act designating 11 watersheds in the United States for work in flood prevention. One of these was the Washita; and the job was in the hands of the Soil Conservation Service.

At this time the term, "upstream flood prevention", came into frequent use. It meant the use of soil- and water-conservation measures on a watershed's agricultural land to check part of the runoff and hold soil in place. Then, for the runoff that still might occur, there would be floodwater-retarding dams designed to release the flow at a rate in keeping with the stream channel's capacity.

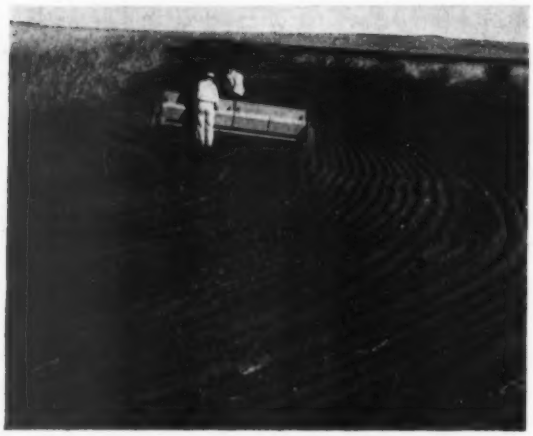
One of the reasons the engineering phase of the program could begin without undue delay was the progress that had been made already in land treatment. Soil conservation districts blanketed the entire watershed. Cover cropping and contour cultivation, regrassing of denuded and rapidly eroding areas, use of vegetated waterways to carry runoff from terrace systems, and other conservation practices were already on much of the land. This part of the program was fundamental; not only to do its share in slowing and lessening runoff, but also to safeguard the engineering works by holding down sediment loads borne by runoff waters.

Today, there are 19 soil conservation districts in the Washita watershed. They have formed the Washita Valley Council of Soil Conservation Districts, which has taken over the work of the Washita Valley Improvement Association. The council is made up of one representative from the governing body of each of the 19 districts.

This council recommends to the Soil Conservation Service the priority of all creek watersheds for planning and construction. It also has the job of working with the State Soil Conservation Board in making use of a $50,000



A floodwater-retarding structure in the Washita watershed empties water from a 6-inch rain through a 24-inch outlet.



Seeding a grass waterway in the Washita watershed.

revolving fund, that the State Legislature provided in 1955, for the purchase of lands, easements, and rights-of-way in situations where local resources might be unequal to the need.

By early 1957, two-thirds of the farmers and ranchers in the Washita watershed were cooperating with soil conservation districts in moving toward a common goal: The use of every acre of agricultural land within its capabilities, and the treatment of each acre according to its needs. Four-fifths of the cooperating farmers and ranchers had developed basic conservation plans. Nearly half of all the soil- and water-conservation measures needed were on the land.

The first studies by the Soil Conservation Service of the Washita's potentialities were on very small segments of the watershed. This was because a small group of interested landowners, with about 5 or 6 thousand acres, could work effectively in doing all the things needed for the flood-prevention job. The first structures, in fact, were installed on a small drainage area. They were built on Cloud Creek, a tributary of Calvary Creek, and dedicated in June 1950.

However, experience soon proved that a more efficient job in both planning and installation could be done on creek-size watersheds; and, the job went ahead on that basis.

Interest was high over the entire watershed. This group or that wanted work to begin in its own area. Landowners generally were ready to sign easements giving the soil conservation districts authority, without cost, to place the needed structures on their lands.

In late 1950, soil conservation district leaders and SCS officials agreed that an example of a complete installation of upstream flood-prevention measures was needed. They wanted a working demonstration of the principles involved so that all landowners in the Washita and other watersheds could see for themselves just how land treatment and engineering structures work together. They were certain that a fully-treated watershed would show beyond a doubt that this kind of flood prevention would pay handsome dividends.

They chose Sandstone Creek watershed, with a 65,000-acre drainage, on the Washita's western reaches. There were several reasons for picking Sandstone. It had been averaging 9 floods a year with annual damages amounting to $60,000. A good part of the needed soil conservation treatment had been applied, insuring protection to a practical degree for the engineering structures. And, most important, the landowners and other local people were alert to the opportunity, informed as to the value of this kind of flood protection, and eager to cooperate with their soil conservation districts.

By 1952, the 24 floodwater-retarding dams and the 13 gully-control structures called for in the Sandstone Creek plan, had been installed. Well over half the drainage area had all the soil conservation treatment needed. The land

Native grass pasture on a formerly eroded and abandoned field near Clinton, Okla.

treatment and the floodwater structures repeatedly have saved the bottomlands from severe flooding.

The story of Sandstone Creek, especially since it has had a thorough testing of its flood prevention work, has become a popular one. And the man who no doubt tells the story most often is the Cheyenne banker, L. L. Males, one of the original flood prevention enthusiasts.

Males likes to dwell especially on the contrast between that creek and the others in nearby, untreated watersheds. Sandstone flows almost continuously these days with clear, sparkling water. The big reason, Males points out, is the soil-plant-water program that is at work on almost the entire 65,000 acres.

This banker has told the story, illustrated with colored slides, before many groups, including members of Congress and President Eisenhower.

In the 5-million acre Washita watershed are 64 creek-size watersheds, some of them larger and some smaller than Sandstone. The whole plan calls for 888 floodwater-retarding dams like the 24 in Sandstone. Of these, 155 have been built or are under contract. This is more than one-third of all the floodwater-retarding structures built in the entire 11 flood prevention projects authorized in 1944.

Land treatment scores as well. In the Washita project there are nearly 500,000 acres of contour farming, nearly 200,000 acres of crop-residue management, 227,000 acres of range seeding, and 20,000 miles of terracing. This is one-fourth of all the contour farming now being practiced in the 11 authorized watersheds, nearly one-fifth of the cover cropping, more than a fifth of all the crop-residue management, five-sixths of the range seeding, and more than a third of the terracing.

The land treatment part of the big program has made good progress in spite of the record drouth the region has been experiencing. Planning and design of structures, as well as easements from landowners, are well ahead of money available for construction.

In addition to the large reservoir at Fort Cobb, a second large structure has been authorized for construction by the Bureau of Reclamation at Foss, farther upstream. Its functions, like the Fort Cobb project, will be irrigation, water supply, and flood control.

Six other such reservoirs are listed, in an overall tentative plan for the Washita watershed, for further consideration if and when conditions justify.

But how did the rapid development of upsteam flood prevention on the Washita come about? Why could the Washita program get off to such a fast start while similar projects remained for years in the "tooling-up" stage? The answer goes back to the start of this story, to the efforts of the folks with a vision and a will to try for it. They were the folks like Wray, Wingo, Savage, Church, Males, Cassady, DeWeese and Longmire. They worked hard and long for this panorama that is unfolding in their watershed. They have a right to show a little pride.

SOIL USE AND IMPROVEMENT. By J. H. Stallings. 403 pp. Illustrated. 1957. New Jersey: Prentice-Hall, Inc. $5.95

THIS is an especially well-written book for use as a text in high school or a reference in soil conservation for vocational agriculture, general agricultural, or Veterans' training courses. Also, farmers and ranchers will find this book valuable.

It is well illustrated with pictures showing the effects of erosion and principles of corrective measures. At the end of each chapter, several good suggested exercises and questions are listed that will be valuable to the instructor and student.

The book is composed of three parts: Part I describes the historical phase of erosion, including the effect of erosion on nations during Biblical times, and the extent of erosion in the United States. Part II deals with the fundamental considerations in conservation, including how water and wind erode soils, soil surveys, land capability classes, and land judging. Part III contains 14 chapters relating to various conservation practices that will reduce erosion, as well as how to plan and establish a conservation plan for farms and ranches.

—B. D. BLAKELEY

DRAINAGE AT CROWHEART

Local, State, and Federal agencies get together to solve seepage problems on irrigated land of the Wind River Indian Reservation.

By JOHN W. McLELLAN

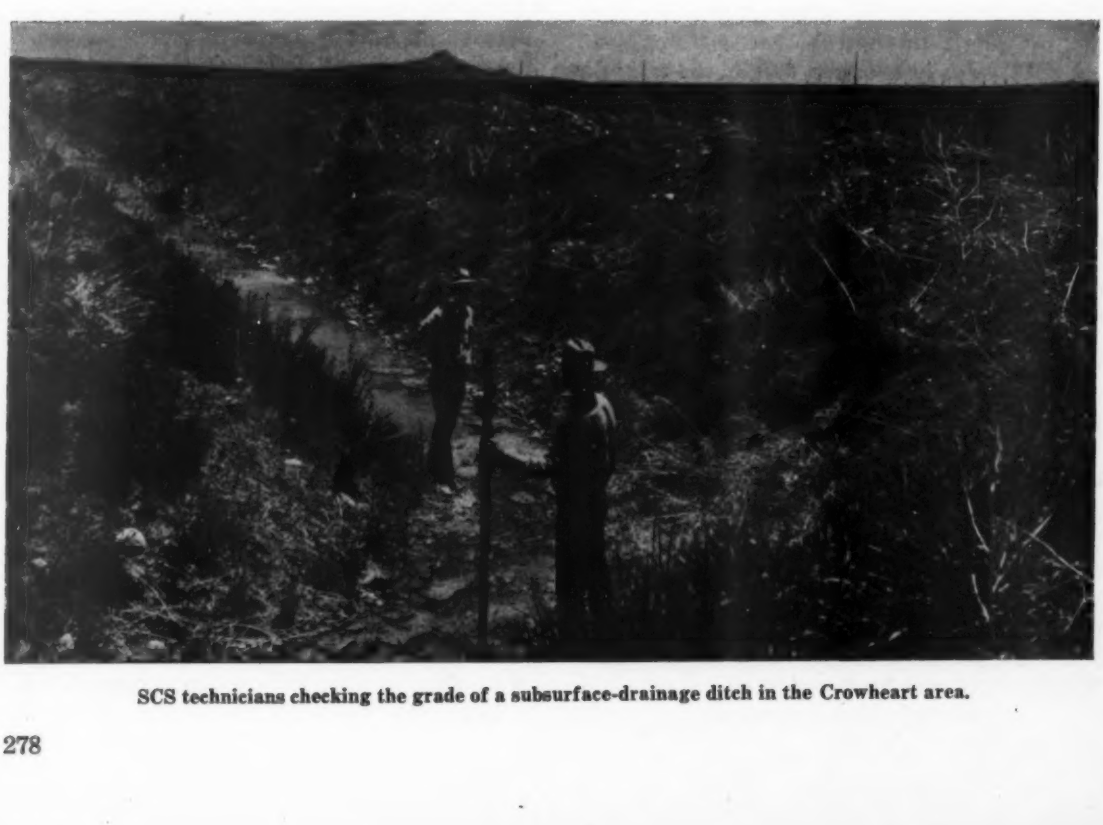
A SEEPAGE problem had existed for years in the Crowheart Area of the Wind River Indian Reservation. It had become progressively worse, until more than one-fifth of the irrigated acreage was affected. Some areas were completely out of production. Many local people were concerned about the problem, but because of its complex nature, nothing had ever been done about it until the Wind River Indian Agency, the Water Users' Association, and the Board of Supervisors of the Dubois-Crowheart Soil Conservation District sat down together and decided that something had to be done about the problem.

The area is within the Wind River Indian Reservation. Most of the cultivated land is farmed by white operators who either own the land or lease it from the Indian owners. The white- and Indian-controlled land is so intermingled that an operator's desire to lower a detrimental water table on his unit was subject, not only to his neighbor's wishes, but also, to those of the Tribal Council and Indian Irrigation Service.

Different uses of adjacent land, and the fact that a high water table might hurt one operator while helping another, had stopped any drainage attempt.

In the fall of 1952, Carl Urbigkit, secretary of the Dubois-Crowheart Soil Conservation District, and Gordon Pennoyer, a cooperator and secretary of the Water Users' Association, called a meeting at which many local farmers and representatives of the Wyoming Extension Service, Indian Service, and the Soil Conservation Service were present. A field working agreement evolved from the meeting.

Note.—The author is geologist, Soil Conservation Service, Worland, Wyo.



SCS technicians checking the grade of a subsurface-drainage ditch in the Crowheart area.

Floyd Foresman of SCS (left) and Gordon Pennoyer, SCD supervisor, examine the improved stand of desirable grasses after subsurface drainage.

The agreement provided for the Soil Conservation Service to complete conservation plans on the private lands, and provide a geologist to make technical studies of ground water conditions on both Indian and other lands. The Indian Service was to provide engineering help and other assistance during these studies, explain the benefits of the proposed program to Indian owners, and construct the drains that were recommended by the study. The State Extension Service was to make an economic survey of the area and carry out an educational program among the private landowners.

The studies made showed that about 1,500 acres of the 2,000 involved needed drainage, and that the construction of subsurface interception-type drainage ditches was the only practical way of overcoming the "seeped" condition. Exploratory well drilling and engineering surveys proved that ample gradient and suitable outlets existed, along with a drainable subsoil.

While this information was being gathered the Extension Service was making the economic study of the area and conservationists and soil scientists of the SCS were making soil surveys and continuing to develop conservation plans with ranch operators.

All of this information was assembled into a final report and presented to the group in the spring of 1953. The local people and the agencies unanimously decided that the proposed program was feasible and should be carried out.

The Indian Service began construction of the drains in the spring of 1954, and by 1956 had completed three of the main drainage ditches called for in the plan. There was a marked lowering of the water table in these areas. Nearly solid stands of foxtail and dandelions grew before drainage work started. Since the water table was lowered, bromegrass and other desirable plants began crowding out the foxtail. The yields on hay fields adjacent to these drains are at least double what they were before. Several hundred acres improved sufficiently to make reseeding of hay and pastureland feasible.

This cooperative effort has been an example to all people concerned in the area of what can be done with a difficult problem by getting together and talking it over.

FIVE GOOD NEIGHBORS.—Idaho soil conservation districts usually are flat broke when they start doing business because they don't receive any public funds from Federal, State, county, or local governments. And they don't assess prospective members; nor are they allowed to go into debt. Somehow they have to make it before they can spend it; and sometimes years pass before they make any money. Very often the members of a governing body, and sometimes the cooperating technicians, dip into their pockets and chip in a few dollars to pay for such operating necessities as postage, stationery, and phone bills.

So it was a real shocker at the organizational meeting of the Salmon River Soil Conservation District when supervisor George Russell had a wad of bills shoved into his official hands before he could take his seat after having been sworn in as treasurer.

It all came about because each of 5 neighboring SCDs chipped in 10 dollars apiece from their treasuries so the "baby" in the divisional group would have something "to go on".

Salmon River SCD embraces 385,000 acres, mostly rangeland. Snake and Salmon Rivers cut through its boundaries, and it is so rugged that you have to travel on foot or horseback to traverse it. The area includes part of the famous Snake River "Hells Canyon". Likewise it is the home of the equally celebrated "Seven Devils" Mountain Range. But, the presence of these characters doesn't worry Salmon River supervisors because they know that at least "Five Angels" are watching over and have much interest in them, and stand ready to lend a helping hand if ever there is need for more assistance.

—HUGH F. EAMES

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DETROIT

A PROFITABLE TREE CROP.—A paragraph from the 1956 Annual Report of the Florence Soil Conservation District, S. C., states:

"At the time he developed his farm plan, 5 years ago, a district cooperator proposed to bulldoze a tract of young timber for pasture development. The local SCS technician advised against this and helped plan other land use adjustments to provide sufficient pasture land. Last summer the farmer was offered $4,000 for the timber above 10-inches in diameter. After consulting the SCS technician, the farmer engaged a forester to mark the trees for selective thinning and then sold on a bid basis. He received $10,000 for the timber cut, and says he still has more than half the trees left and they are growing more rapidly than ever before."

STRIP MINING.—A cooperative study of the detrimental effects of strip mining on soil, water, and natural resources was started in the fall of 1955 on Beaver Creek Watershed, near Greenwood, Ky. Kentucky's cooperating agencies were the Agricultural and Industrial Board, Department of Conservation; Strip Mining and Reclamation Commission; Division of Flood Control and Water Usage; Water Pollution Commission; and the Department of Fish and Wildlife Resources. Federal agencies cooperating were: Geological Survey; Forest Service; Corps of Engineers; Fish and Wildlife Service; and Soil Conservation Service.

Information obtained from the study will be used to: (1) design reclamation measures that will hold the detrimental effects of strip mining to a minimum; (2) provide data to improve strip mining regulations; (3) estimate size of sediment pool required in future reservoirs; (4) estimate increased costs of treating water supplies for domestic and industrial uses; (5) determine the effects on fish; and (6) test theories on stream geometry.

Studies are being made on 3 watersheds of about 500 acres each. Two of the watersheds are strip-mined watersheds and the third is the control watershed.

A preliminary report on the project was made in May 1956, and will be made annually thereafter during the operation of the project. Preliminary findings and trends will be discussed and basic data released as soon as it becomes available.

Several states have enacted legislation regulating strip mining. Among them are Ohio, Pennsylvania, and Kentucky. In the Act creating the State Strip Mining and Reclamation Commission, the Kentucky General Assembly stated that: ". . . the unregulated strip mining of coal causes soil erosion, stream pollution, the accumulation of stagnant water, seepage of contaminated water, increase in the likelihood of floods, destruction in the value of land for agricultural purposes, counteraction of efforts for the conservation of soil, water, and other natural resources, destruction or impairment of property rights of citizens, creation of fire hazards, and in general, creation of hazards dangerous to life and property, so as to constitute an imminent and inordinate peril to the welfare of the Commonwealth."

AIRCRAFT IN AUSTRALIAN AGRICULTURE.—During the 3 month period ending June 30, 1956, airplanes were used to treat 116,000 acres of pasture in New South Wales, Australia. Nearly 8,000 tons of phosphate fertilizer and 50,000 pounds of clover seed were applied to 102,000 acres by airplane. About 14,000 acres of pasture were treated with herbicides and insecticides. In addition, around 65,000 acres of other crops were treated with herbicides and insecticides by planes.

—The Agricultural Gazette, Sydney, Australia.

EGYPTIAN AGRICULTURE.—With a population of about 23 million, Egypt has only 6.2 million acres along the banks of the Nile and its delta that are available for cultivation. Yet, the production and processing of farm commodities account for about 60 percent of the national income and nearly 90 percent of Egyptian exports.

WHERE DID THE RABBITS GO?—The Cooperative Wildlife Research Unit at Iowa State College completed a study on a 185-acre farm to find out whether rabbits actually disappear in the fall as fast as hunters think they do.

On September 1 there were 284 rabbits on the farm. By December 31, only 41 of these rabbits remained. In the meantime, hunters had killed only 10 rabbits.

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SOIL CONSERVATION

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VOLUME XXII

August 1956 to July 1957

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : Issued 1957

UNITED STATES DEPARTMENT OF AGRICULTURE

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